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## A Framework for Visually Monitoring Business Process Compliance (Extended Abstract)

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**Abstract:** Any enterprise must ensure that its business processes comply with imposed compliance rules. This extended abstract presents a comprehensive framework for visually monitoring business process compliance. As opposed to existing approaches, the framework supports the visual monitoring of all relevant process perspectives based on the *extended Compliance Rule Graph* (eCRG) language. Furthermore, it not only allows for the detection of violations, but additionally highlights their causes. Finally, the framework assists users in both monitoring business process compliance and ensuring the compliant continuation of running business processes. Overall, the framework provides a fundamental contribution towards the real-time monitoring of compliance in process-driven enterprises. The work summarized in this extended abstract has been published in [KRK15a, KRK15b, KRK17].

**Keywords:** business process compliance, compliance monitoring, visual business analytics

Enterprise must ensure that their business processes comply with imposed *compliance rules*. Usually, respective rules reflect domain-specific requirements that refer to, for example, corporate guidelines, standards, best practices, and legal regulations [GS09]. In general, compliance rules may refer to various perspectives of business processes, including process behavior (i.e. control flow), data, time, resources, and interactions with business partners [CRRC10, Tu12]. However, business process compliance can be ensured in different phases of the process life cycle [LRD08]. In particular, ensuring compliance during process enactment is covered by *compliance monitoring* approaches. The latter observe the events of running business processes (e.g., start and completion of activities) in order to detect run-time violations of compliance rules as well as to notify users accordingly.

10 fundamental *compliance monitoring functionalities* (CMFs) were presented in [Ly15]. Some of them demand support for the time, data and resource perspectives of business processes, whereas some other CMFs address event correlation, multiple activations of compliance rules, and root cause analysis for compliance violations. However, [Ly15] finally concludes that the combination of an expressive language with full traceability has not been well understood yet as existing approaches only partially support the CMFs.

In [KRK17], we present a comprehensive framework for visually monitoring business process that supports all 10 CMFs and is based on earlier work [KRK15a, KRK15b, Ly11]. The framework utilizes the *extended Compliance Rule Graph* (eCRG) language [KR16]

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for the visual and formal specification of compliance rules with support for multiple process perspectives (i.e., control flow, data, time, resources, and interactions with business partners). [KRK17] annotates the various elements of an eCRG with texts, colors and symbols when processing the events of an event stream. These *visual markings* not only constitute a suitable basis for deriving the state of a particular compliance rule, but also for highlighting the *causes* of observed compliance violations. The markings are further used to specify and measure *compliance metrics* as well as to enable the *recommendation* of the tasks to be performed such that compliance can be ensured.

Altogether, the framework presented in [KRK17] not only meets the compliance monitoring functionalities (CMFs) introduced in [Ly15], but complements them with additional features (e.g., interactions with business partners). At the core of the framework is a visual language, which we denote as *extended Compliance Rule Graph* (eCRG). The eCRG language is not only used to specify compliance rules, but further utilized to realize visual compliance monitoring. Note that the latter involves proper user feedback as well.

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